DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date August 24, 1994

From Toxicologist, CS, EICB, DHAC (E57)

Subject Health Consultation: Westgate Mobile Home Park (Exide Battery Site), Greer, Spartanburg County, South Carolina (40WV)

To Carl Blair
ATSDR Regional Representative
U.S. EPA Region 4
Through: Director, DHAC (E32)
Acting Chief, EICB, DHAC (E57)
Acting Chief, CS, EICB, DHAC (E57)

BACKGROUND AND STATEMENT OF ISSUES

The U.S. Environmental Protection Agency - Region 4 (EPA) has requested that the Agency for Toxic Substances and Disease Registry (ATSDR) review analytical data from the Westgate Mobile Home Park in Greer, South Carolina, and determine if lead contamination in soil presents a public health threat [1].

The mobile home park is located within the city limits of Greer, South Carolina, and consists of approximately 50 units. Immediately west of the mobile home park is a lead storage battery manufacturer that has been operating since the 1960s; a chain link fence separates the mobile home park from the battery manufacturer. The park is bordered on the north by Chick Springs Road, to the east by Buncombe Road, and Suber Mill Road to the south.

In January 1992 the South Carolina Department of Health and Environmental Control (SCDHEC) collected 3 surface soil samples (0 - 3 inches in depth) from the mobile home park and analyzed for the 8 RCRA metals. Lead was detected at 270, 560, and 800 parts-per-million (ppm). In March 1992, SCDHEC collected 3 surface soil samples from the park and analyzed for lead; lead was detected at 340, 490, and 780 ppm.

On June 29, 1994, an EPA Technical Assistance Team (TAT) collected 55 soil samples (0 - 12 inches) from the mobile home park; all samples were analyzed for total lead [2]. Analytical results indicated lead concentrations ranging from 32.1 to 2,110 ppm. Six samples had lead at concentrations greater than 500 ppm (range, 551 ppm - 2,110 ppm) [2].

On June 29 & 30, 1994, 22 children and adults from the trailer park were tested for blood lead levels; 7 children (aged infant to 12 years of age) and 1 adult had blood lead levels greater than 10 micrograms per deciliter (mcg/dL). The 7 children had blood lead levels ranging from 11 to 23 mcg/dL and the adult blood lead level was 37 mcg/dL. Fourteen of the original group of 22 were retested on July 15, 1994; 9 children (aged 1 to 8 years of age) had blood lead levels greater than 10 mcg/dL, ranging from 11 to 23 mcg/dL.

DISCUSSION

Limited sampling at the Westgate Mobile Home Park has indicated the presence of elevated levels of lead in soil. Most of the samples were collected at a depth of 0 to 12 inches; because exposure to contaminated soil is most likely to occur in the top 3 inches, sampling at greater depths may not allow a complete evaluation of the potential public health threat.

Blood lead testing of residents from the mobile home park has indicated that some residents have elevated blood lead levels. Data and information are not available to determine the source of the elevated blood lead levels in the residents from the park.

The Centers for Disease Control and Prevention has indicated there is scientific evidence that some adverse health effects occur at blood lead levels at least as low as 10 mcg/dL in children [3]. Young children and fetuses are especially sensitive to the toxic properties of lead. Factors accounting for this susceptibility include (1) the immaturity of the blood-brain barrier which allows entry of lead into the immature nervous system; (2) hand-to-mouth behavior and pica behavior which leads to consumption of lead contaminated media; (3) enhanced gastrointestinal absorption of lead (affected by the nutritional status of the child); (4) low body weight; and (5) the ready transfer of lead across the placenta to the developing fetus [4]. These factors put children exposed to lead at a much higher risk of developing adverse health effects than adolescents and adults.

Studies indicate that ingestion and inhalation of lead contaminated media can contribute to elevated blood lead levels. Blood levels in young children have been reported to be raised, on average, about 5 mcg/dL for every 1,000 milligrams of lead per kilogram of soil or dust, and may

increase 3 to 5 times higher than the mean response depending on play habits and mouthing behavior [3]. Blood lead levels of 10 mcg/dL and above have been associated with adverse health effects such as developmental and hearing impairment, and reductions in intelligence quotients (IQ) in children [3,4]. Lead has long been known to have effects on heme biosynthesis. Lead inhibits the activity of certain enzymes involved in heme biosynthesis such as δ-aminolevulinic acid dehydratase (ALAD). Reductions in ALAD production in adults have been demonstrated at an oral dose of 0.02 milligrams lead per kilogram body weight per day (mg/kg/day) for 3 days [4].

Since lead readily crosses the placental barrier, exposure of women to lead during pregnancy results in uptake by the fetus. Prenatal exposure to lead (8-14 mcg/dL fetal cord blood lead level) is associated with premature delivery, decreased birth weight, impaired postnatal neuro-behavioral development, and decreased postnatal growth rate [4].

CONCLUSIONS

Based on review of the available data, ATSDR concludes the following:

1. Limited sampling indicates that lead is present in soil at the Westgate Mobile Home Park at levels that may present a public health threat.

2. The extent of lead contamination in surface soil at the Westgate Mobile Home Park has not been fully characterized.

3. Some residents of the Westgate Mobile Home Park have elevated blood lead levels that may result in adverse health effects; the source of the elevated blood lead has not been determined.

RECOMMENDATIONS

1. Completely characterize the extent of lead contamination in surface soil (0 - 3 inches in depth) at the Westgate Mobile Home Park.

2. Determine the source/cause of the elevated blood lead levels in park residents.

3. Residents, especially children, with elevated blood lead levels should receive appropriate followup and treatment.

4. Prevent exposure of residents to environmental media that contain elevated levels of lead that may cause elevated blood lead levels.

If further clarification is required or if additional information becomes available, please do not hesitate to contact this office at (404) 639-6360.

Steven Kinsler, Ph.D.

REFERENCES

1. ATSDR Record of Activity, Westgate Mobile Home Park, Carl Blair, July 29, 1994, 4:00 p.m.

2. Memorandum, To: File, From: Paula C. MacLaren, Analytical Coordinator, Subject: Exide Battery Site Analytical Data, Date: July 19, 1994, Weston Technical Assistance Team for Emergency Response Removal and Prevention.

3. Preventing Lead Poisoning in Young Children, A Statement by the Centers for Disease Control, U.S. Department of Health and Human Services, Public Health Service, October 1991.

4. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead, Update, U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, Atlanta, Georgia, April 1993.